NOW AVAILABLE
Grooved-end Pipe Connections

Chilled Water Buffer Tanks

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Selecting a Chilled Water Buffer Tank

Cemline Chilled Water Buffer Tanks (CWB) are designed to be used with chillers which do not have water volumes of sufficient size in relation to the chiller. The insufficiently sized systems do not have enough buffer capacity for the chilled water causing poor temperature control, erratic system operation, and excessive compressor cycling. The CWB solves this problem by adding volume to buffer the system. The CWB reduces the rate of change of the return water temperature.

Chillers are designed to be used in systems with a minimum water volume. The minimum water volume is based upon the chiller manufacturer requirements, typically 3 to 6 gallons per ton for typical air conditioning applications or 6 to 10 gallons per ton when temperature accuracy is critical. When chiller systems are properly sized, the chiller compressor will not short cycle. Without the proper amount of system water, the source temperature will be reached quickly and the compressor will shut off. Many chiller compressors can only start 3 times per hour. If the compressor is off and there is a demand for chilled water, the demand can not be met because the compressor cannot turn back on. This causes very unsatisfied people within the building who cannot have the required cooling. Insufficiently sized system problems can cause excessive compressor cycling, poor temperature control and erratic system operations.

### CWB Sizing

Chiller manufacturers recommend the system volume should be between 3 to 6 gallons per ton of nominal cooling for typical air conditioning applications. When temperature accuracy is critical, they recommend 6 to 10 gallons per ton of nominal cooling.

### Step 1

Calculate the system volume required by the manufacturer. Please check with the manufacturer specific recommendations for gallons per ton of nominal cooling required and use in the below equation.

\[
\text{Required system volume (RSV)} = \text{Chiller tons} \times \text{Recommended system volume/ton}
\]

### Step 2

Calculate the existing water volume of the system. The system includes piping and terminal equipment. The table below shows how many gallons per foot are in schedule 40 steel pipe. Add to the pipe volume to the volume of the terminal equipment.

### Standard Equipment

- Tank - ASME (125 psi @ 400°F)
- \(\frac{1}{2}\)“ flexible, elastomeric thermal insulation black in color (Thicknesses of \(\frac{3}{4}\), 1”, \(\frac{3}{4}\), 2” available)
- Legs for vertical installation
- Internal Baffle
- Air Vent

### Available Options

- Seismic zone 4 angle legs (4 qty)
- Outdoor exterior coating. White in color and weather resistant to UV and ozone.
- Outdoor stucco-embossed aluminum jacket (0.016” thick, 26 GA)

### Table: Gallons Per Foot of Steel Pipe

<table>
<thead>
<tr>
<th>Pipe Size Schedule 40 Steel Pipe</th>
<th>Gallons Per Foot</th>
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<tbody>
<tr>
<td>1</td>
<td>0.04</td>
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<tr>
<td>1.5</td>
<td>0.1</td>
</tr>
<tr>
<td>2</td>
<td>0.17</td>
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<td>3</td>
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<td>5</td>
<td>1.04</td>
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<td>6</td>
<td>1.5</td>
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<table>
<thead>
<tr>
<th>Pipe Size Schedule 40 Steel Pipe</th>
<th>Gallons Per Foot</th>
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<tbody>
<tr>
<td>8</td>
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<td>11.67</td>
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<tr>
<td>20</td>
<td>14.45</td>
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</table>
Step 3
Calculate the tank size required. Buffer tank size required is calculated by subtracting the actual system volume from the required system volume.

![Tank Volume Table]

Chilled water tanks can be supplied with inlet/outlet openings selected from the chart at right.

Step 4
Select insulation thickness based upon tank temperature and maximum ambient temperature + humidity.

![Tank Temperature Table]

Example
A building has a 100 Ton Chiller with a flow rate of 240 g.p.m. through 300 feet of 4” pipe. The unit to be located indoors with a tank temperature of 45 °F unit to have standard leg stands.

1. **Required system volume** = (chiller tons) x (recommended system volume/ton)
   100 ton x 5 gallons/ton = 500 gallon volume required

2. **Actual system volume** = (piping volume) + (terminal equipment volume)
   Piping volume: 300 ft x 0.66 gallons/ft = 198 gallon
   Terminal equipment = 35 gallon
   Actual system volume = 198 + 35 = 233 gallon

3. **Tank size required** = (required system volume) - (actual system volume)
   500 gallon - 233 gallon = 267 gallon

4. **Insulation required** = 1/2”

Therefore, choose a V300CWB with 4” flanges or grooved-end pipe with 1/2” thick insulation Model No. V300CWB4F-C-05-I
Chilled Water Buffer Tanks - Submittal Drawing

<table>
<thead>
<tr>
<th>Tank Volume</th>
<th>Diameter &quot;D&quot;</th>
<th>Length &quot;L&quot;</th>
<th>Drain &quot;A&quot;</th>
<th>Vent &quot;B&quot;</th>
<th>Distance of Center of Opening &quot;C&quot;</th>
<th>&quot;E&quot;</th>
<th>&quot;G&quot;*</th>
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</thead>
<tbody>
<tr>
<td>120</td>
<td>24&quot;</td>
<td>60&quot;</td>
<td>1&quot;</td>
<td>3/4&quot;</td>
<td>12&quot;</td>
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<td>200</td>
<td>30&quot;</td>
<td>72&quot;</td>
<td>1&quot;</td>
<td>3/4&quot;</td>
<td>14&quot;</td>
<td>24&quot;</td>
<td>46&quot;</td>
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<tr>
<td>300</td>
<td>36&quot;</td>
<td>72&quot;</td>
<td>1&quot;</td>
<td>3/4&quot;</td>
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<td>24&quot;</td>
<td>46&quot;</td>
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<tr>
<td>500</td>
<td>42&quot;</td>
<td>90&quot;</td>
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<td>3/4&quot;</td>
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<td>3/4&quot;</td>
<td>24&quot;</td>
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<td>70&quot;</td>
</tr>
</tbody>
</table>

"*G dimension for Flanged and Grooved-end pipe only.

Model Number Code

V __________ CWB __________

GALLON CAPACITY OPENING SIZE

OPENING TYPE
F = Flange
N = NPT
G = Groove End Pipe

SUPPORT
C = Leg Stands
SL = Stucco Embossed Aluminum Jacket

INSULATION THICKNESS
None = 0
1/2" = 05
3/4" = 075
1" = 10
1 1/2" = 15
2" = 20

LOCATION
I = Indoor
O = Outdoor Coating
A = Stucco Embossed Aluminum Jacket
N = No Insulation

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